

CLAIMS

1. A process for the preparation of cross-linked polysaccharides containing carboxy groups, comprising:
- 5 a) activation of the carboxy groups of the polysaccharide by reaction with suitable carboxy activating groups in anhydrous aprotic solvent;
- b) reaction of the carboxy activated polysaccharide with a polyamine.
2. A process according to claim 1, wherein the polysaccharide is selected from Hyaluronic acids (obtained from tissues or bacteria),
- 10 carboxymethyldextran, carboxymethylcellulose, carboxymethylstarch, alginic acids, cellulosic acid, N-carboxy-methyl or butyl glucans or chitosans; heparins with different molecular weights, optionally desulphated and succinylated, dermatan sulphates, chondroitin sulphates, heparan sulphates, polyacrylic acids.
- 15 3. A process according to claim 1 or 2, wherein the carboxy activating agent is selected from carbonyldiimidazole, carbonyltriazole, chloromethylpyridylum iodide (CMP-I), hydroxybenzotriazole, p-nitrophenol p-nitrophenyltrifluoroacetate, N-hydroxysuccinimide.
4. A process according to any one of claims 1 to 3, wherein the
- 20 polyamines have the following general formula:
- $$R_1-NH-A-NH-R_2$$
- wherein  $R_1$  and  $R_2$ , which are the same or different, are hydrogen,  $C_1$ - $C_6$  alkyl, phenyl or benzyl groups, A is a  $C_2$ - $C_{10}$  alkylene chain, preferably a  $C_2$ - $C_6$  alkylene chain, optionally substituted by hydroxy, carboxy, halogen,
- 25 alkoxy, amino groups; a polyoxyalkylene chain of formula
- $$[(CH_2)_n-O-(CH_2)_n]_m$$
- wherein  $n$  is 2 or 3 and  $m$  is an integer from 2 to 10; a  $C_5$ - $C_7$  cycloalkyl group; an aryl or hetaryl group, preferably 1,3 or 1,4-disubstituted benzene.
5. A process according to any one of claims 1 to 4, wherein the

Sub  
a<sub>1</sub>

polysaccharide is salified with lipophilic cations.

6. ~~A process according to claim 5, wherein the lipophilic cation is tributyl or tetralkyl ammonium.~~

7. A process according to any one of claims 1 to 6, wherein the cross-  
5 linking reaction is carried out in anhydrous dimethylformamide or tetrahydrofuran.

8. A process according to any one of claims 1 to 7, wherein the obtained cross-linked polysaccharide is further subjected to sulfation of the hydroxy groups by reaction with the pyridine/sulfur trioxide complex.

10 9. ~~A process according to claim 8, wherein the sulfation reaction is carried out in dimethylformamide in heterogeneous phase at 0-10°C. for times from about 0.5 to about 6 hours.~~

10. A process according to any one of claims 1 to 9, wherein the cross-linked, optionally sulfated polysaccharide, is further subjected to  
15 complexation reaction with aqueous solutions of copper, zinc or iron ions.

11. Cross-linked polysaccharides obtainable by the process of claims 1 to 10.

Sub  
a<sub>2</sub>Sub  
a<sub>3</sub>add  
B<sub>1</sub>